Observations on some tropical species of the lichen genus *Mycoblastus* Norman (Mycoblastaceae)

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Abstract

Kantvilas, G. (2016). Observations on some tropical species of the lichen genus *Mycoblastus* Norman (Mycoblastaceae). ***Austrobaileya* 9(4): 539–545.** Three species of *Mycoblastus* from tropical latitudes are enumerated. Two are described as new: *M. oreotropicanus* Kantvilas from montane habitats in Papua New Guinea and *M. physodalicus* Kantvilas from Mt Bellenden Ker, Queensland, Australia. The nomenclatural complexities surrounding *M. dendrophorus* (Vain.) Zahlbr. from the Philippines are resolved, with a lectotype designated for this species, and its two forms, f. *hypomelaena* Vain. and f. *hypoleuca* Vain., reduced to synonymy. A key to the species of *Mycoblastus* recorded from the Southern Hemisphere is provided.

Key Words: Mycoblastaceae, *Mycoblastus*, *Mycoblastus dendrophorus*, *M. oreotropicanus*, *M. physodalicus*, lichenised fungi, new species, taxonomy, Australia lichen flora, Papua New Guinea lichen flora, Philippines lichen flora, Queensland lichen flora, identification key

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Introduction

The lichen genus *Mycoblastus* Norman is characterised by a crustose thallus containing a green coccoid photobiont, typically large, black or dark pigmented, immarginate apothecia, rich in colourful pigments, highly branched and anastomosing paraphyses that form a network around the asci, and lecanoralean asci that mostly contain one or two, relatively large, hyaline, usually simple ascospores (Kantvilas 2009; James & Watson 2009). Species of *Mycoblastus* typically occur on organic substrata such as humus-rich soil, wood or bark in cool, moist environments. The genus is more or less equally represented in both hemispheres, chiefly in temperate latitudes or at higher elevations in the tropics and subtropics.

The Southern Hemisphere species of the genus were revised by Kantvilas (2009) who treated eight species, chiefly from cool to cold temperate regions. That study suggested that there was some heterogeneity within the genus, with two groups supported by differences in thallus chemistry, ascus structure and ascospore morphology: the *Mycoblastus sanguinarius* (L.) Norman group, with single-spored *Mycoblastus*-type asci (after Hafellner 1984) and mostly containing atranorin, and the *M. dissimulans* (Nyl.) Zahlbr. group, with 2(–4)-spored asci approximating the *Biatora*-type and usually containing perlatolic acid (Kantvilas 2009). Subsequently Spribille *et al.* (2011a) demonstrated further heterogeneity within the *M. sanguinarioides* group using molecular methods, and erected a segregate genus *Violella* T.Sprib. for the Northern Hemisphere species, *M. fucatus* (Stirt.) Zahlbr. (Spribille *et al.* 2011b); the status of the *M. dissimulans* group was not investigated.

In the course of a revision of the genus *Mycoblastus* for the Southern Hemisphere (Kantvilas 2009), numerous additional specimens, including types from other regions were also studied (e.g. Kantvilas 2011). In this paper, three taxa from tropical latitudes are resolved. Including one unresolved taxon, this brings the number of species recorded for the Southern Hemisphere to eleven. A key to these species is provided.

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Material and methods

The study is based on specimens housed in the Natural History Museum, London (BM), collections from Papua New Guinea, kindly made available by Dr André Aptroot (ABL), and the collections of the author, housed in the Tasmanian Herbarium (HO). Observations of the thallus and apothecia are based on hand-cut sections mounted in water, 15% KOH (K) and 50% HNO_3 (N), and in Lugols Iodine (KI) and Lactophenol Cotton Blue after pretreatment with KOH. The description of ascus characters, apothecial pigments and ascospores follows Kantvilas (2009, 2011) where detailed accounts and illustrations of these features are provided. The two pigments observed are *fucatus*-violet (Kantvilas 2009) and *cinereorufa*-green (Meyer & Printzen 2000). Chemical analyses were undertaken by thin-layer chromatography using standard methods (Orange *et al.* 2001). For the new species, dimensions of ascospores are presented in the format, 5th percentile–*average*–95th percentile, with extreme outlying values in brackets; the number of observations is also given.

Taxonomy

1. Mycoblastus dendrophorus (Vain.) Zahlbr., *Catal. Lich. Univers.* 4: 3 (1926); *Lecidea dendrophora* Vain., *Ann. Acad. Sci. Fenn.,* Ser. A, 15: 139 (1921); *Lecidea dendrophora* f. *hypomelaena* Vain., *nom. inval.*, *Ann. Acad. Sci. Fenn.,* Ser. A, 15: 140 (1921); *Mycoblastus dendrophorus* f. *hypomelaenus* (Vain.) Zahlbr., *Catal. Lich. Univers.* 4: 3 (1926). **Type:** Philippines. Negros, vulcanus Canlaon, April 1910, *E.D. Merrill 6882* (lecto [here designated]: BM!).

Lecidea dendrophora f. *hypoleuca* Vain., *Ann. Acad. Sci. Fenn.,* Ser. A, 15: 140 (1921); *Mycoblastus dendrophorus* f. *hypoleucus* (Vain.) Zahlbr., *Catal. Lich. Univers.* 4: 3 (1926). **Type:** Philippines. Negros, vulcanus Canlaon, April 1910, *E.D. Merrill 6867* (iso: BM!).

Thallus pale greyish, composed of rather nodulose warts or granules 0.1–0.15 mm wide that soon become elongate, coralloid-isidioid and 0.5–0.8 mm tall, not sorediate, thinly scattered or in dispersed clusters over an effuse, very thin and patchy, blackish to dull bluish grey prothallus. **Apothecia** 0.3–0.8(–1) mm diameter, convex to subglobose, basally constricted, immarginate, dull or glossy black. **Proper exciple** in section 40–80 µm thick, hyaline to pale yellowish brown within, usually with bluish green, N+ crimson *cinereorufa*-green pigment in the outermost parts, becoming deflexed and ± excluded in older apothecia. **Hypothecium** hyaline to pale yellowish, ± intensifying yellowish or yellow-orange in KOH, densely inspersed with oil droplets. **Hymenium** densely inspersed with oil droplets, in the upper part intensely pigmented with a mixture of *cinereorufa*-green and *fucatus*-violet and appearing blue-black, K+ turquoise green, N+ crimson. **Asci** 2-spored, approximating the *Biatora*-type, with a well-developed, intensely amyloid tholus, pierced almost entirely by a conical, weakly amyloid masse axiale with a rounded apex. **Paraphyses** 1.5–2.5 µm thick, not capitate, highly branched and forming a complex reticulum, becoming rather lax in K. **Ascospores** ovate to ellipsoid, hyaline, persistently simple, 40–56 × 26–32 µm. **Chemistry:** atranorin; all spot tests negative or unreliable. **Fig.1A.**

***Typification*:** When Vainio (1921) described *Mycoblastus dendrophorus* (as *Lecidea dendrophora*) he perceived it had two forms, naming one f. *hypoleuca*, with well developed isidia and an indistinct prothallus, and the other f. *hypomelaena*, with a more verruculose thallus and blackish prothallus. Under the rules of nomenclature of the time, he was not required to erect a f. *dendrophora*; nor did he designate a type specimen for his species, *Lecidea dendrophora*. Having examined the type collections of both forms, I am convinced that just one taxon is involved, and the gradation from a nodulose granular thallus to one with more elongated granules that become coralloid-isidiate is evident in both collections. Nor is such morphology unusual in other species of *Mycoblastus*, as displayed, for example, by *M. oreotropicanus* (described below). Furthermore, the pigmentation of the apothecia and the thallus chemistry, critical characters in delimiting

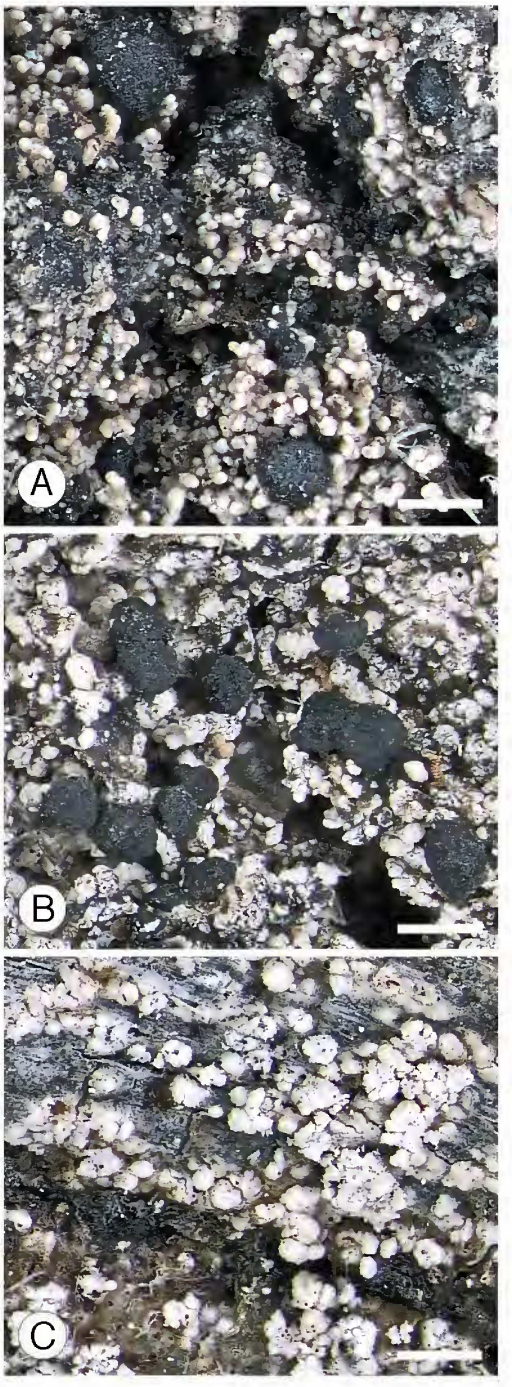

Fig. 1. ***Mycoblastus*** species, habit. A. ***M. dendrophorus*** lectotype, BM; B. ***M. oreotropicanus*** holotype, HO; C. ***M. physodalicus*** holotype, HO. Scale = 0.5 mm.

species of *Mycoblastus*, are the same in both. In uniting the two forms, the specimen of f. *hypomelaena* is selected as the lectotype, as it better displays the range of morphology of this species, from verruculose to elongated coralloid-isidioid, as well as having apothecia with better developed asci and ascospores. Thus both forms become synonyms under *M. dendrophorus*, and f. *hypomelaena* is deemed invalid (Art. 9.2, 9.11, 9.12 of the *Melbourne Code*).

***Notes*:** The material studied was in relatively poor condition, with few apothecia having an intact hymenium with well-developed asci and ascospores. Consequently it was not possible to make comprehensive observations of all characters, but the above description captures the salient features of the species. Critical features that characterise this species are the combination of a coralloid-isidioid thallus containing atranorin and the *Biatora*-type asci. The ascus type suggests a relationship between *M. dendrophorus* and the many, chiefly Southern Hemisphere species of the *M. dissimulans* group of Kantvilas (2009). However, the occurrence of atranorin is very unusual as most species of the group contain perlatolic acid.

2. Mycoblastus oreotropicanus Kantvilas **sp. nov.** *Mycoblasto bryophilo* Imshaug ex Kantvilas similis et item thallo granuloso vel verruculoso, acidum perlatolicum continenti et apotheciis pigmentum aeruginosum tinctis sed sorediis destitutis et ascosporis grandioribus, 50–100 µm longis, 24–60 µm latis differt. **Typus:** Papua New Guinea. Northern Province: Owen Stanley Range, Myola, *c.* 3 km NE of guesthouse, 9°08'S 147°47'E, 16 October 1995, *A. Aptroot 37645* (holo: HO).

Thallus whitish to pale cream, composed of scattered or crowded and contiguous, rather nodulose warts or granules 0.1–0.5 mm wide, not sorediate; prothallus not developed. **Apothecia** 0.4–1.2 mm diameter, convex to subglobose, basally constricted, immarginate, dull or glossy black. **Proper exciple** in section 40–100 µm thick, mostly hyaline within, usually with bluish green, N+ crimson *cinereorufa*-green pigment in

the outermost parts, becoming deflexed and ± excluded in older apothecia. **Hypothecium** 100–150 µm thick, hyaline to pale yellowish, ± intensifying yellowish in KOH, densely inspersed with oil droplets. **Hymenium** 110–200 µm thick, very densely inspersed with oil droplets, in the upper part intensely or dilutely pigmented with *cinereorufa*-green, K± olive-green, N+ crimson, rarely also with traces of *fucatus*-violet, K+ vivid turquoise green, N+ orange. **Asci** 120–170 × 45–60 µm, (1–)2(–4)-spored, approximating the *Biatora*-type, with a well-developed, intensely amyloid tholus, pierced almost entirely by a conical, weakly amyloid masse axiale with a rounded apex. **Paraphyses** 2–3 µm thick, not capitate, highly branched and forming a complex reticulum between and extending above the asci, remaining ± coherent in KOH, especially at the apices. **Ascospores** ovate to ellipsoid, hyaline, persistently simple, (50–)52–*69.4*–90(–100) × (24–)27–*38.2*–56(–60) µm; wall 5–8 µm thick. **Pycnidi**a not observed. **Chemistry:** perlatolic acid (major); all spot tests negative. **Fig. 1B.**

***Additional specimens examined*: Papua New Guinea, Simbu Province:** Mt Wilhelm, Pindaunde Valley, along track to summit, 5°47'S, 145°03'E, Aug 1992, *Aptroot 39544 p.p.* (ABL); *ibid*, Aug 1992, *Aptroot 33082 p.p.* (ABL); Mt Wilhelm, Pindaunde Valley near Lake Piunde, 5°47'S, 145°03'E, Aug 1992, *Aptroot 32647* (ABL); Mt Wilhelm, SE slope, 5°47'S, 145°03'E, Mar 1987, *Aptroot 18419* (ABL).

***Notes*:** *Mycoblastus oreotropicanus* is characterised by the combination of a granular-nodulose thallus containing perlatolic acid, the predominance of *cinereorufa*-green pigment in the apothecia and the relatively large ascospores. In some specimens the thallus becomes rather abraded but is never sorediate; in others the granules become somewhat elongate and almost coralloid, similar to what is seen in *M. dendrophorus*. The presence of perlatolic acid and the *Biatora*-type asci indicate that, within the genus *Mycoblastus*, the new species belongs to the *M. dissimulans* group. The most similar species in this group is *M. bryophilus*, which may also have a granular or nodulose thallus and apothecia dominated by *cinereorufa*-green but occasionally containing additional *fucatus*-violet pigment. However, *M. bryophilus* differs by being sorediate and by having smaller ascospores, 50–66 × 26–40 µm. Indeed the large ascospores of *M. oreotropicanus* distinguish it from all other esorediate, perlatolic acid only-containing species (*M. dissimulans, M. coniophorus* (Elix & A.W.Archer) Kantvilas & Elix, *M. kalioruber* Kantvilas) where no species has ascospores larger than 66 × 40 µm, and the average size is 43.1–49.5 × 24.2–28.1 µm (Kantvilas 2009). These species differ further in consistently containing fatty acids in addition to perlatolic acid. In analyses of *M. oreotropicanus*, traces of atranorin and other compounds were sometimes detected, but as these findings were not repeatable, they are considered to be due to contamination from associated lichen species.

***Distribution and habitat*:** *Mycoblastus oreophilus* is a lichen of subalpine (2700–4100 m altitude) scrub and alpine, treeless vegetation where it occurs on twigs of small shrubs, the bark of trees and on litter. All collections known so far are from Papua New Guinea.

***Etymology*:** The specific epithet alludes to the occurrence of this species in highland areas of the tropics (from the Greek prefix *oreo*-, meaning montane).

3. Mycoblastus physodalicus Kantvilas **sp. nov.** A *Mycoblasto disporo* (C.Knight) Kantvilas thallo disperse areolato, tandem papillato, sorediascenti differt. **Typus:** Australia. Queensland. Cook District: Mt Bellenden Ker summit area, ridge-line N of telecommunications facility, 20 October 2009, *G. Kantvilas 422/09* (holo: HO; iso: BRI).

Thallus crustose, whitish cream, comprised of irregular areoles, scattered or contiguous over an effuse, pale to dark blue grey prothallus; areoles becoming lumpy, 0.15–0.25 mm wide, developing isidia-like papillae that become abraded and coarsely sorediate; soredia whitish and concolorous with the thallus. **Apothecia** and **pycnidia** unknown. **Chemistry:** perlatolic and physodalic acid; thallus and soredia K–, KC–, C–, P+ orange-red, UV± whitish. **Fig. 1C.**

***Notes*:** Clearly it is not ideal to describe a new species without access to fertile material. However, in this case, more than six years have passed since this very distinctive taxon was first collected and studied, during which time several herbaria have been searched for additional collections without success. Physodalic acid is a rare metabolite in *Mycoblastus*, being known only from *M. disporus* (C.Knight) Kantvilas, a non-sorediate, austral species which likewise also contains perlatolic acid. Superficially, the new species is reminiscent of *M. campbellianus* (Nyl.) Zahlbr., although that species has a continuous, smooth thallus, discrete, speck-like or tuberculate soralia, and the P+ metabolite is virensic acid.

***Distribution and habitat*:** *Mycoblastus physodalicus* is known only from the type collection on the summit of Mt Bellenden Ker in the Wet Tropics of Queensland. The species was collected from fallen canopy limbs of *Dracophyllum sayeri* F.Muell. in low dense, scrubby forest dominated by *Leptospermum wooroonooran* F.M.Bailey at *c.* 1500 m altitude. Also present on this substratum were small thalli of additional, sterile *Mycoblastus* species which could not be determined.

***Etymology*:** The specific epithet refers to the occurrence of physodalic acid in this species.

Identification key to the Southern Hemisphere species of *Mycoblastus*

1 Thallus not sorediate **2**
1. Thallus sorediate **6**

2 Asci exclusively one-spored, with the ascospore ellipsoid to oblong, usually >60 µm long; apothecia frequently with small patches of reddish pigment beneath; thallus containing atranorin; Australia (Tasmania, Victoria), North America, north-eastern Asia . . . . . **M. sanguinarioides**
2. Asci usually at least two-spored, with ascospores ellipsoid to ovate, mostly <60 µm long (except to 100 µm in one taxon); red pigments not present beneath apothecia; thallus lacking atranorin but containing perlatolic acid **3**

3 Thallus P+ orange-red (containing physodalic acid in addition to perlatolic acid); Australia (Tasmania), New Zealand . . . . . **M. disporus**
3. Thallus P– (physodalic acid lacking) **4**

4 Thallus composed of scattered or contiguous nodulose warts or granules; ascospores 50–100 × 24–60 µm; containing perlatolic acid only; New Guinea . . . . . **M. oreotropicanus**
4. Thallus smooth to unevenly lumpy and verruculose, continuous; ascospores 35–70 × 18–40 µm **5**

5 Upper part of hymenium containing *cinereorufa*-green and/or *fucatus*-violet pigments; hypothecium colourless to pale yellow, usually K+ yellowish or yellow-orange; containing perlatolic acid ± fatty acids; Australia (Tasmania), New Zealand, southern South America, subantarctic islands, Chile (Juan Fernandez) . . . . . **M. dissimulans**
5. Upper part of hymenium with *cinereorufa*-green pigment only; hypothecium vivid yellow, K+ intense blood red; containing hybocarpone in addition to perlatolic and fatty acids; Australia (Tasmania, Victoria), New Zealand . . . . . **M. kalioruber**

6 Soredia P+ orange-red (containing physodalic, virensic or protocetraric acids, with or without perlatolic acid) **7**
6. Soredia P– (containing perlatolic acid without additional depsidones) **10**

7 Soredia confluent from the outset and forming a thick, granular crust; containing protocetraric and perlatolic acids); Australia (New South Wales, Victoria) . . . . . **M. leprarioides**
7. Soredia arising in discrete soralia that may become diffuse and confluent only in later stages of development **8**

8 Soredia whitish to cream, ± concolorous with the thallus, arising from abrasion of scattered, isidia-like papillae; containing physodalic acid; Australia (Queensland) . . . . . **M. physodalicus**
8. Soredia whitish, paler than the usually dull leaden grey thallus, occurring in discrete, rather fleck-like soralia; thallus mostly smooth and continuous, containing virensic or protocetraric acids **9**

9 Containing virensic acid in addition to perlatolic acid; Australia (Tasmania, Victoria), New Zealand, southern South America, subantarctic islands . . . . . **M. campbellianus**
9. Containing protocetraric acid and lacking perlatolic acid; New Caledonia, Australia (Queensland) . . . . . **M. sp. cf. M. campbellianus**

10 Soredia ocurring in erumpent soralia; uncommon, typically growing on soil or turf; Australia (Tasmania), subantarctic islands . . . . . **M. bryophilus**
10. Soredia arising from cracks in the thallus and soon becoming scattered and confluent, sometimes forming a granular crust; very common and widespread, typically growing on bark or wood, more rarely on sheltered rocks; Australia (Tasmania, New South Wales, Victoria), New Zealand, southern South America; Chile (Juan Fernandez); subantarctic islands (including Macquarie Island) . . . . . **M. coniophorus**

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